

Amendments to the Claims:

Attached is a listing of claims that will replace all prior versions, and listings, of claims in the application:

What is claimed is:

1. **(Currently Amended)** An apparatus for embedding a watermark into an original audio signal, comprising:

a linear prediction analysis means for generating a prediction coefficient ~~of the~~of an original audio signal by means of a linear prediction analysis after the original audio signal has been inputted thereto;

a residual signal output means for outputting a residual signal of a delayed version of the original audio signal by filtering the delayed version of the original audio signal using the prediction coefficient generated by the linear prediction analysis means;

~~a delay means for delaying the original signal for a predetermined delay time (τ);
—— a linear prediction analysis filter for outputting the residual signal by eliminating the inherent spectrum of the delayed original audio signal after filtering the delayed original audio signal using the prediction coefficient;~~

an echo signal generation means for generating an echo signal of the original audio signal by synthesizing the prediction coefficient of the original audio signal and the residual signal of the delayed original audio signal; and

a copyright information insertion means for generating a watermarked audio signal by combining the original audio signal, the ~~and the~~ echo signal of the original audio signal, and ~~having~~ copyright information ~~therein~~;

wherein the residue signal output means further comprises:

a delay means for delaying the original audio signal for a predetermined delay time; and

a linear prediction analysis filter for outputting the residual signal by eliminating an inherent spectrum of the delayed original audio signal after filtering the delayed original audio signal using the prediction coefficient; and

wherein the copyright information insertion means further comprises:

an error correction encoder configured to output an error corrected copyright information signal;

a sign generator configured to assign a sign to the output of the linear predication analysis filter based upon the error-corrected copyright information signal; and

a summer configured to output a watermarked audio signal by adding the sign-assigned echo signal outputted from the sign generator and the original audio signal.

2. (Original) The apparatus as recited in claim 1, wherein the linear prediction analysis means generates the prediction coefficient which is able to predict an inherent spectrum of the audio by virtue of the linear prediction analysis.

3. (Canceled).

4. (Previously Presented) The apparatus as recited in claim 1, wherein the predetermined delay time (τ) is a detection key of the watermark.

5. (Previously Presented) The apparatus as recited in claim 1, wherein the echo signal generation means is a linear prediction synthesis filter for outputting the echo signal of the original audio signal by synthesizing the prediction coefficient of the original audio signal outputted from the linear prediction analysis means and the residual signal of the delayed version of the original audio signal outputted from the residual signal output means.

6. (Canceled).

7. **(Currently Amended)** The apparatus as recited in ~~claim 6~~claim 1, wherein the error correction encoder outputs ~~each different value, i.e., 0 or 1,~~ a value according to the copyright information, the sign generator assigns a positive sign or a negative sign to the echo signal of the original audio signal and the summer outputs the watermarked audio signal having the copyright information therein by adding the echo signal to the original audio signal or subtracting the echo signal from the original audio signal.

8. **(Currently Amended)** A method for embedding a watermark into an original audio signal, the method comprising the steps of:

a) generating a number of prediction coefficients of the original audio signal by means of the linear prediction analysis;

b) outputting a residual signal of a delayed version of the audio signal by filtering the delayed version of the original audio signal and eliminating an inherent spectrum of the audio signal, using the prediction coefficients of the original audio signal;

c) outputting a synthesis signal ~~by using~~using the prediction coefficients of the original audio signal and the residual signal of the delayed original audio signal;

d) ~~granting~~applying an error correction function ~~to the~~to inputted copyright information to generate an error corrected copyright information signal;

e) assigning a sign to the synthesis signal ~~after an~~based upon the error corrected copyright information ~~is inputted thereto~~; and

f) outputting a watermarked audio signal by adding the original audio signal and the synthesis signal ~~that to which~~ a predetermined sign has been assigned.

9. **(Currently Amended)** An apparatus for detecting a ~~watermark~~copyright within ~~from a~~ watermarked audio signal, the apparatus comprising:

a linear prediction analysis means for generating a ~~prediction coefficient~~predetermined number of prediction coefficients based upon an inputted ~~by means of the linear prediction analysis of the watermarked audio signal, wherein the linear prediction analysis means generates the residual signal in which the residual signal of the original audio signal and the residual signal of the delayed version of the original signal;~~

a linear prediction analysis ~~filter for~~filter configured to receive a delayed version of the watermarked audio signal, filter the delayed signal using the generated prediction coefficients and output a residual signal from which a spectrum of the inputted audio signal has been eliminated~~outputting a residual signal by eliminating an inherent spectrum of the original audio signal after filtering the watermarked audio signal using the prediction coefficient;~~

a short-time autocorrelation means for calculating an autocorrelation value using the outputted residual signal ~~outputted from the linear prediction analysis filter~~; and

a sign detection means for ~~detecting the~~outputting copyright information after detecting a sign of the value outputted a detected sign of the ~~from the short-time autocorrelation means~~value; and

~~wherein the watermarked audio signal uses a residual signal of a delayed version of the original audio signal that is delayed for a predetermined delay time (τ)~~ an error correction decoder that receives the output of the sign detector means and outputs error-corrected copyright information.

10. **(Canceled).**

11. **(Canceled).**

12. **(Previously Presented)** The apparatus as recited in claim 9, wherein the short-time autocorrelation means finds out the residual signal of the original audio signal and the residual signal of the delayed version of the original audio signal by calculating the autocorrelation of the residual signal.

13. **(Currently Amended)** The apparatus as recited in claim 9, wherein the sign detection means investigates a correlation sign of the residual signal of the original audio signal and the residual signal of the delayed version of the original signal, thereby outputting an output value, i.e., 0 or 1, according the correlation sign.

14. **(Currently Amended)** A method for detecting ~~a watermark~~copyright information from a watermarked audio signal, the method comprising the steps of:

a) generating a predetermined number of prediction ~~coefficient~~coefficients by means of a linear prediction analysis of the watermarked audio signal;

b) outputting a residual signal by eliminating an inherent spectrum of the audio signal after filtering the watermarked audio signal using the prediction coefficient;

c) calculating an autocorrelation using the residual signal; and

d) detecting the copyright information after detecting a sign of the value outputted from the short-time autocorrelation means;

wherein the watermarked audio signal uses a residual signal of a delayed version of the original audio signal that is delayed for a predetermined delay time (τ).